

Physical Activity Intensity Predicts Objective But Not Subjective Hot Flash Experience

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Objective: Hot flashes (HFs) are a menopausal symptom experienced by about 80% of women and can last for over 7 years. The cause of HFs is still unknown; however, some data suggest self-reported physical activity (PA) may influence the HF experience. As skin conductance allows HFs to be objectively measured, questions arise as to whether objectively-measured PA impacts HF physiology (objective measure) or a woman's perception of HFs (subjective measure). Examination of the relation between objectively-measured PA and HFs could improve the quality of information provided to women and influence lifestyle and treatment decisions. The goal of this project was to determine whether the HF experience was altered by objectively-measured PA. **Design:** Women aged 45-55 years, who were not taking hormone therapy or other medications that may reduce HF frequency or severity (e.g., SSRI's, clonidine, gabapentin, or black cohosh), were recruited for this study. We targeted women with irregular menstrual periods or a last menstrual period within the past two years. Ambulatory HF experience and objective PA were recorded simultaneously for 24 hours. Objective HF experience was recorded via sternal skin conductance (Biolog, UFI, Morrow Bay, CA). Participants were instructed to press a button on the Biolog monitor when they felt a HF - a measure of subjective HF experience. The Actigraph GT3X+ PA monitor (Pensacola, FL) was worn on the wrist for 24 hours. Biolog data were manually examined for each HF type. Objective HFs were defined by an increase in skin conductance $> 2 \mu\text{mhos}$ over 30 seconds and/or by a distinctive pattern (sudden spike followed by a slow descent). Subjective HFs were marked at the time of a button push or by entries on a hot flash diary. Hot flashes were deemed concordant when an objective HF and subjective HF occurred within 20 minutes of one another. Frequency of HFs per hour were calculated for each HF type. Physical activity data were analyzed using Actilife software (v6.13.4) and broken down by intensity into four categories: light, moderate, vigorous, and moderate-to-vigorous (MVPA). Bivariate analyses and hierarchical methods predicting HF frequency by type were run in SPSS (v.21). Models including MVPA were run separately from other models. **Results:** At this time, sixty-six participants (mean age 50.9 ± 2.8 years; mean BMI $28.3 \pm 6.1 \text{ kg/m}^2$) have been included in our analysis; 13 (19.7%) were pre-menopausal, 29 (43.9%) peri-menopausal, and 24 (36.4%) were post-menopausal. Mean ($\pm$ SD) objective HF frequency (HFs/hour) was 0.254 ± 0.34 , mean subjective HF frequency was 0.252 ± 0.62 , and mean concordant HF frequency was 0.09 ± 0.16 . Only concordant HF frequency was associated with menopausal stage (ANOVA, $p = .017$). In bivariate analyses, objective HF frequency was positively correlated with duration of moderate PA ($r = 0.285$, $p = .020$) and duration of MVPA ($r = 0.303$, $p = .013$). Concordant HF frequency was positively correlated with time in vigorous PA ($r = 0.376$, $p = .002$) and time in MVPA ($r = 0.286$, $p = .020$). All hierarchical models adjusted for

menopausal stage and monitor wear time. Models without MVPA adjusted for sedentary time. Objective HF frequency was predicted to increase by .280 per minute of MVPA (95% Confidence Interval: [.000, .002], $p = .032$). MVPA explained 6.8% of variation. Alone, moderate and vigorous PA were not significantly associated with objective HF frequency. Concordant HF frequency was predicted to increase by 0.283 per minute of vigorous PA (CI: [.000, .006], $p = .035$) and by .261 per minute of MVPA (CI: [.000, .001], $p = .041$). Vigorous PA explained 5.9% of the variation. Subjective HF frequency was not associated with any form of PA, nor did any PA explain more than .1% of variation. **Conclusion:** Overall, our data suggest greater amounts of time in moderate and vigorous PA predicts increases in objective and concordant HFs in women aged 45-55. Understanding the role of PA on HF experience can advance efforts to provide accurate information to women undergoing menopause and optimize therapies.

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